Summer is arriving although the fresh snow on the mountain tops seems to disagree. As road managers, any moisture is welcomed in this semi-arid state. After watching the evacuation plans for Fort McMurray fire complex, that snow is actually a welcomed site. This brings to mind various safety concerns for road crew and summertime operations, and that would be dehydration, heat exhaustion and heat stroke.

Although we could not get Summer Survival squeezed into the training calendar this last spring, here are a few reminders for everyone:

**Dehydration:** Remember to keep those water containers full and keep drinking fluids all day long. It is possible to lose fluids so quickly that the normal thirst mechanism is overwhelmed or overridden. There are many ways we have fluid loss including respiration and perspiration.

The rate of loss from each of these will vary according to the activity levels, air temperature, humidity, and altitude. Just with normal activity, we lose about one to two liters of water via evaporation from the lungs.

**Heat Exhaustion:** Remember that the primary cause of symptoms for heat exhaustion appears to be related to the amount of sodium and chloride ions rather than the amount of water lost. It can be treated rapidly with one teaspoon of table salt (sodium chloride) dissolved in a quart of water, sipped slowly during a 15-minute period.

Salt tablets are too concentrated and should be avoided. This is not a life-threatening illness. Symptoms include fatigue, exhaustion, nausea, light-headedness, and possibly heat cramps. With about twelve hours of rest, heat exhaustion is self-correcting.

**Heat Stroke:** This is a life-threatening emergency. Without proper care heat-stroke victims will most likely die. Once our cooling mechanism fails, our core temperature begins to rise rapidly. Death can occur in as little as 30 minutes. The brain will dilate all the blood vessels in the skin. As a result, the skin becomes red, hot, and may be dry. As the brain overheats, the individual may become disoriented, combative, argumentative, and possibly hallucinate wildly.

Primary goal is to cool the victim as rapidly as possible. The simplest and most efficient method is to soak the victim with water, fanning them to increase the rate of evaporation, and massaging their extremities to encourage the return of cool blood to the core.

With a limited supply of water, cooling the head becomes the top priority. All heat stroke victims must be transported to the hospital as quickly as possible, continuing the cooling process during evacuation. Heat stroke victims are dehydrated and require rehydraion. Unfortunately getting them to drink may be impossible.

---

**Local Technical Assistance Program**

*LTAP Matters is published by the Local Technical Assistance Program. LTAP is located at Western Transportation Institute, College of Engineering, Montana State University, Bozeman, Montana.*

We can be reached at the following:

Phone: (800) 541-6671 or (406) 994-6100

FAX: (406) 994-5333

E-Mail: MTLTAP(at)montana.edu

Our website lists upcoming training courses, registration forms, library information, our contact information, newsletters, various links, and MACRS information. Please go to: http://www.montana.edu/ltap/

The Local Technical Assistance Program/Tribal Technical Assistance Program (LTAP/TTAP) is a nationwide network of 58 centers - one in every state, seven serving Native American tribal governments and one in Puerto Rico.

---

**MT LTAP Advisory Committee Members**

The Advisory Board meets annually to make recommendations and evaluate the effectiveness of the Montana LTAP program.

- **Steve Albert**
  - WTI Director
- **Harold Biattie**
  - MACo
- **Kris Christansen**
  - Montana Dept of Transportation
- **Thomas Danenhower**
  - MMIA
- **Kelly Elser**
  - Town of Ennis
- **Eric Griffin**
  - Lewis and Clark County
- **Justun Jueifs**
  - Montana Dept of Transportation
- **Bob Seliskar**
  - Federal Highway Administration
- **Jim Rearden**
  - City of Great Falls
- **Justun Jueifs**
  - Montana Dept of Transportation
- **Jim Muskovich**
  - MACo
- **Kris Christansen**
  - Montana Dept of Transportation
- **Jim Rearden**
  - City of Great Falls
- **Bob Seliskar**
  - Federal Highway Administration
- **John Van Deinder**
  - City of Bozeman
Gravel Roads Workshops in High Demand

Seventy-six percent of Montana’s roads are unpaved and of the almost 75,000 miles of public roads in Montana, about 62,000 miles are maintained by counties and city street departments.

In order to assist these local governments with the latest research and innovations, gravel roads training was provided in three locations this past May: Great Falls, Missoula and Billings. Each class was well attended by the county and city street workforce. These workshops will be offered again next spring.

The course outline included an introduction to safety on gravel roads, correct roadway shaping, and understanding what constitutes good gravel materials along with a standard gravel road design.

An overview included understanding the importance of a crown on the roadway, how to maintain that crown in order for proper drainage, and how to determine what needs to be added to gravel road materials for dust control.

Gilson sieves were recommended to understand what type of materials are in the local gravel pits and to be able to test what type of gravel is being brought in from other locales or vendors.

Recommended sieve sizes included: 1”, 3/4”, 1/2”, No. 4, No. 8, and No. 40. Please call the Montana LTAP office if needing assistance in ordering these sieves.

Other information taught involved understanding what happens when roadways are poorly designed and possible solutions for different road conditions. Items reviewed were use of culverts, geotextiles and aggregates for drainage problems. Also covered were various dust abatement solutions.


Above photos from Missoula Gravel Roads field trip and classroom participants.
Trucking Safely Through Work Zones

As the summer months come upon us, it is important to remember when driving through work zones in large trucks or being a driver in a smaller vehicle, the issues involved for truck drivers and how we can all work together to make our work zones safer.

The Federal Highway Administration issued a pamphlet on this specific topic “Trucking Safely Through Work Zones.” It can be found at this link: http://safety.fhwa.dot.gov/wz/resources/fhwasa03010/fhwasa03010.pdf

Angle, rear-end, and head-on collisions are the most common types of work zone crashes involving large trucks:

HOW many occur?
• Almost 30 percent of all work zone crashes involve large trucks
• The number of people killed in work zone crashes involving large trucks has been increasing. Over 1,000 fatalities and over 18,000 injuries have occurred during the last 5 years.

WHEN do the happen?
• 65 percent of fatal work zone crashes involving large trucks occur during the day.
• Six times as many fatal work zone crashes involving large trucks occur on Monday through Friday (the weekdays) compared to Saturday and Sunday (the weekend).

WHERE do they take place?
• About 60 percent of fatal work zone crashes involving large trucks take place on divided roads.
• Over 70 percent of fatal work zone crashes involving large trucks occur on level roadways.
• Almost 90 percent of fatal work zone crashes involving large trucks occur on straight roads.

Safety Practices for Drivers of Large Trucks
Work zones often result in narrow lanes, merging, shifting lanes, slowing and stopping traffic, unexpected work vehicles entering the traffic flow, temporary speed limit adjustments, flaggers in the roadway, confused drivers, and other disruptions.

• Always wear your safety belt.
• Pay attention to the signs.
• Adhere to instructions by the flagger.
• Leave enough space between you and the vehicle in front of you to stop safely.

• Take advantage of your driving height and anticipate braking situations.
• Get into the correct lane well in advance of lane closures.
• Be cautious of motorists racing to get ahead of you in merge areas.
• Be aware of your No-Zone areas where crashes are more likely to occur.
• Avoid work zones by using alternate routes where possible.

The No-Zone area around a large truck is where one-third of all crashes between large trucks and cars happen. The driver cannot see vehicles in these areas, even with the best mirrors. Having this knowledge could save your life and the lives of others when coming into a work zone and giving the truck driver space to maneuver.

As Montana Department of Transportation emphasizes the three S’s of the Work Zone: Manage Your Speed, Manage Your Space, and Manage Your Stress.

There is MDT Travel Info map at this link: http://roadreport.mdt.mt.gov/travinfomobile/. So be sure to slow down in work zones, keep a safe distance between yourself and other vehicles.
Parting Shot From Richland County

With two very dedicated MACRS officers retiring this summer, LTAP wanted to honor them both and consequently have two “Parting Shot” columns in this issue. This column spotlights Richland County’s Public Works Director Russ Huotari:

After growing up in Glendive, I moved to Sidney in June, 1975, directly after graduating from Montana State University with a degree in Construction Engineering Technology and Dawson College with a surveying degree. I always knew I wanted to work outside and build “stuff.” Fortunately I was hired as the Assistant County Surveyor for Richland County. After a couple years I was appointed the Surveyor until I could run for office and was elected County Surveyor. In 1988, my position was expanded to assume Road Supervisor duties.

In 1980, I was introduced to RTAP when Tom Valente came to Sidney with training on Time-value-of-money. I used this information to create a very successful equipment replacement program and endeared me to LTAP for my career because I recognized their efforts were to make me more successful, which in turn made our County better.

In 1980 I traveled to Livingston to the Spring MACRS (Montana Association of County Road Supervisors) Conference where I met 20+ members who would become mentors for this young Road Supervisor. I truly value the input I received from these older hands, all committed public servants wanting to share. This was my event where I realized the close relationship between LTAP and MACRS. They must have wanted young members, because the next year I was elected to my first of 15+ years as the Treasurer. Being an officer in MACRS proved to be a valued opportunity.

As a supervisor, two of the most important elements is training and safety. In most respects the terms are synonymous. LTAP proved to be our resource to accomplish needed training. This included using many venues such as LTAP videos, literature, and on-site classroom training.

During MACRS events I had the opportunity to attend a National Association of County Engineers Conference as well as annually attend the Region 8 Conference in Rapid City, South Dakota. All these are great events, but didn’t exceed the quality of our own “home-grown” annual spring MACRS Conferences administered by LTAP.

LTAP’s Fall MACRS Districts Training has been an event I truly supported since it opened up another venue for our typical crew to attend.

There is one more venue I feel important to mature: Train the Road Supervisor. My first conference in 1988 was made up of Road Supervisors with a clear peer-to-peer relationship. I think a Supervisor-only event would create closer relationships while discussing issues relative to this specific audience.

Forty-one years ago, Ed the County Surveyor informed me on my first day, “You won't get rich but it is a good place to work.” Now in retrospect I must be quoted as “Being a public servant has been very challenging but I’ve lived a very rich, rewarding life working for Richland County in the State of Montana.”

LTAP and MACRS played a major role in my daily work life, and presented the opportunity for me to interact with so many dedicated public servants.

Respectfully,

Russ Huotari, Public Works Director
Richland County
### Calendar of Events • July 2016 - December 2016

#### July 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>

4: Fourth of July Holiday - Offices Closed  
18-21: National LTAP/TTAP Summer Conference, Madison, WI

#### August 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


#### September 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

5: Labor Day Holiday - Offices Closed  
7 & 8: 27th Annual Equipment Safety Training and Snow Rodeo - Helena, MT (MT LTAP) Brochure available in July  
18-22: MACo 107th Annual Conference, Billings, MT www.mtcounties.org or MACo’s Karen Houston 406-449-4360  
20: MT LTAP Safety Webinar:TBA 7:30am-8:00am

#### October 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MACRS Fall District Meetings: TBA

#### November 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8: Election Day - Offices Closed  
11: Veterans’ Day - Offices Closed  
15: MT LTAP Safety Webinar: TBA - 7:30am - 8:00am  
16: LTAP Leadership - Great Falls - 8am - noon  
16 & 17: MACRS Planning Meeting, 1-5pm and 8am -noon; Great Falls  
24-25: Thanksgiving Holiday - Offices Closed

#### December 2016

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
</tr>
</tbody>
</table>

20: MT LTAP Safety Webinar: TBA - 7:30am-8:00am  
26: Christmas Holiday - Offices Closed

### Training on Request:

- **Summer Survival**
- **Hand Safety**
- **Slips, Trips, & Falls**

### Safety Meeting Webinars from Montana LTAP

Monthly Safety Webinars held at 7:30am usually on Tuesday Mornings  
Call Montana LTAP at 1-800-541-6671 for more information!

If you injure or kill someone while DUI, you can be convicted of vehicular homicide while under the influence. Expect a prison term up to 30 years and fines up to $50,000, or both. DON’T DRINK & DRIVE! § 45-5-106, MCA

Some dates and locations are subject to change.  
Call Genevieve Houska, LTAP, 1-800-541-6671 to confirm.
### January 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

2: New Year’s Day - MT LTAP Offices Closed
8-12: 96th Transportation Research Board, Washington, DC
16: Martin Luther King Day - Offices Closed
17: MT LTAP Safety Webinar-TBA 7:30am
23-24: 15th Annual Safety Congress - Great Falls, MT (MT LTAP)

### February 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

TBA: MACo Mid-Winter Conference
20: President’s Day - Observed (Montana LTAP Offices Closed)
21: MT LTAP Safety Webinar-TBA 7:30am
28: Asphalt Institute - Helena, MT (MT LTAP)

### March 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

13-17: MSU Spring Break
13: Work Zone Flagging - Missoula (MT LTAP)
14: Work Zone Flagging - Great Falls (MT LTAP)
15: Work Zone Flagging- Miles City (MT LTAP)
16: Work Zone Flagging - Billings (MT LTAP)
17: Work Zone Flagging - Billings (MT LTAP)
23: MT LTAP Safety Webinar TBA 7:30am
27 - 30: MACRS 37th Annual Conference - Heritage Inn, Great Falls, MT (MT LTAP)

### April 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

29: Memorial Day - Offices Closed

### May 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

3: Gravel Roads Maintenance & Design - TBA
4: Gravel Roads Maintenance & Design - TBA
5: Gravel Roads Maintenance & Design - TBA
9: Work Zone Flagger Certification - Great Falls
10: Work Zone Flagger Certification - Havre
21 - 27: National Public Works Week (APWA)
TBA: SafetyFestMT - www.safetyfestmt.com
16: MT LTAP Safety Webinar: TBA 7:30am

### June 2017

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

TBA: LTAP North Central Regional Meeting
6: Work Zone Flagging - Bozeman
7: MACRS Executive Meeting, 1-5pm - Bozeman
8: MT LTAP Annual Advisory Board Meeting, 9am-12pm - Bozeman
20: MT LTAP Safety Webinar - TBA 7:30am

### Training Opportunities at Montana LTAP Website:
http://www.montana.edu/ltap/training/index.html
Best Practices for RAP and RAS Management

NAPA (National Asphalt Pavement Association) published Best Practices for RAP and RAS Management in January 2016. It is listed in our library and available at: https://www.asphaltpavement.org/PDFs/EngineeringPubs/QIP129_RAP_-_RAS_Best_Practices_Lr.pdf

You may recognize the author, Randy C. West, Ph.D., P.E., Director of the National Center for Asphalt Technology at Auburn University. Dr. West recently spoke at our collaborative Asphalt Conference with the Asphalt Institute this past February 2016.

He also wrote an article for Asphalt Pavement_May/June 2016 highlighting various aspects of this 44-page document. (http://www.nxtbook.com/naylor/NAPS/NAPS0316/#/22)

There are examples in Best Practices for RAP and RAS Management for guidance on stockpiling:

Table 2-1 on Page 26 summarizes the advantages and disadvantages of various RAP processing options:

<table>
<thead>
<tr>
<th>Process</th>
<th>Possible Advantages</th>
<th>Possible Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Millings Without Further Processing</td>
<td>• Avoids further crushing of aggregate particles in RAP, which may allow for higher RAP contents in mixes.</td>
<td>• Requires multiple RAP stockpiles at the plant.</td>
</tr>
<tr>
<td></td>
<td>• Lowest cost RAP processing option.</td>
<td>• Millings from individual projects are different; therefore, when a particular millings stockpile is depleted, new mix designs must be developed with other RAP.</td>
</tr>
<tr>
<td>Screening RAP Before Crushing</td>
<td>• Limits crushing of aggregate particles in RAP, which reduces dust generation.</td>
<td>• Few RAP crushing and screening units are set up to pre-screen RAP.</td>
</tr>
<tr>
<td>Crushing all RAP to a Single Size</td>
<td>• Allows the processed RAP to be used in many different mix types.</td>
<td>• Increases the dust content of RAP stockpiles, which will tend to limit how much RAP can be used in mix designs.</td>
</tr>
<tr>
<td>Fractionizing RAP</td>
<td>• Using different sized RAP stockpiles provides much greater flexibility in developing mix designs.</td>
<td>• Requires the most space for multiple smaller stockpiles.</td>
</tr>
<tr>
<td></td>
<td>• Fine RAP fraction is ideal for Thruway mixes.</td>
<td>• Most expensive processing option (cost of fractionation unit plus additional RAP feed lane).</td>
</tr>
<tr>
<td></td>
<td>• Heat transfer to fine RAP may be more efficient during plant mixing.</td>
<td>• Due to higher AC contents, finer fractionated RAP stockpiles tend to have agglomerations, which may not feed well through the plant.</td>
</tr>
</tbody>
</table>

Pages 28-30 list a step-by-step sampling method:

**Sampling Method**

It is recommended that RAP stockpiles be sampled as they are being built at the location where they will be fed into the asphalt plant. Samples from the different locations around the stockpile should not be combined since the results from the different locations will be used to calculate variability statistics. Sampling at the time the stockpile is built will be easier and more representative of the stockpile compared to samples taken later, after a crust forms on the RAP stockpile.

When a RAP stockpile has been in place for a while, it is generally difficult to dig into with a shovel. The best way to sample existing RAP stockpiles is with the assistance of a front-end loader, as described in Section X1.2 of AASHTO T 2 or ASTM D75-03.

This method is described below and illustrated in the sequence of pictures 1 through 8 in Figure 3-2. (See pages 9 and 10)

1. Use a front-end loader to dig into the ready-to-use RAP stockpile.
2. Empty the bucket on a clean surface to form a miniature sampling stockpile.
3. Use the loader to back blade across the top of the mini stockpile to create a flat surface.

Page 18, Figure 2-1 Illustration of Recommended Practices for RAP Stockpiling

Continued on Page 9...
Best Practices (Cont’d from Page 8)

4. Mini stockpile ready to be sampled.

5. Use a square-end shovel to obtain samples from the surface of the mini stockpile.

6. Sample from three locations over the surface of the mini stockpile.

7. Combine samples taken from the same mini stockpile. This sample will later be divided into test portions.

8. Repeat these steps to obtain samples at other locations around the RAP stockpile. Do not combine samples from different locations.

For projects that use portable asphalt plants set up on a temporary site adjacent to or near the project, typically the only RAP available is millings generated from that project. In these situations, the RAP is typically stockpiled at the plant site just after the plant is set up and continues at the same time as the paving operations.

In order to prepare a mix design using the project millings, it is necessary to obtain RAP samples from the roadway about a month in advance of the plant set up.

The preferred method of obtaining samples of RAP is to use a milling machine to mill small areas of the roadway at the project’s planned milling depth at selected representative locations. This requires mobilization of a milling machine and other equipment to fill in the sampled areas, as well as traffic control for the temporary short lane closures.

This method of sampling is most likely to produce representative samples of RAP for the mix design. Using a skid steer with a small milling head attachment has been found to produce a different gradation than a full-size milling machine. Taking roadway cores and crushing them in the laboratory has also been found to not produce representative material for mix designs.

Figure 3-2. Steps for the best method to sample RAP.

1. Mini stockpile ready to be sampled.
2. Use a square-end shovel to obtain samples from the surface of the mini stockpile.
3. Sample from three locations over the surface of the mini stockpile.
4. Combine samples taken from the same mini stockpile. This sample will later be divided into test portions.
5. Repeat these steps to obtain samples at other locations around the RAP stockpile. Do not combine samples from different locations.

For projects that use portable asphalt plants set up on a temporary site adjacent to or near the project, typically the only RAP available is millings generated from that project. In these situations, the RAP is typically stockpiled at the plant site just after the plant is set up and continues at the same time as the paving operations.

In order to prepare a mix design using the project millings, it is necessary to obtain RAP samples from the roadway about a month in advance of the plant set up.

The preferred method of obtaining samples of RAP is to use a milling machine to mill small areas of the roadway at the project’s planned milling depth at selected representative locations. This requires mobilization of a milling machine and other equipment to fill in the sampled areas, as well as traffic control for the temporary short lane closures.

This method of sampling is most likely to produce representative samples of RAP for the mix design. Using a skid steer with a small milling head attachment has been found to produce a different gradation than a full-size milling machine. Taking roadway cores and crushing them in the laboratory has also been found to not produce representative material for mix designs.
Test Methods
For mix designs using RAP, the data needed from tests on the RAP are:
1. Asphalt binder content of the RAP;
2. Gradation of the aggregate recovered from the RAP;
3. Bulk specific gravity of the RAP aggregate;
4. Consensus properties of the aggregate recovered from the RAP;
5. (For high RAP contents) the RAP asphalt binder properties.

In some cases, additional aggregate tests may be necessary. For example, if the RAP is to be used in a surface mix for high-speed traffic, some agencies may require tests to evaluate the polishing or mineralogical composition of the RAP aggregate.

Trichloroethylene (C2HCl3) was used as the solvent in the centrifuge and reflux methods. The results of the study indicate that:
• The ignition method yielded the most accurate asphalt contents for the RAP and provided the lowest testing variability compared to solvent extraction methods.
• The centrifuge extraction method had the smallest effect on the gradations of the recovered aggregate.
• The combined bulk specific gravity of the aggregates recovered by the ignition method was closest to the original materials, except for the soft limestone aggregate. In that case, the aggregate recovered from the centrifuge extraction was closest to the original material.
• The sand-equivalent and fine-aggregate angularity values for aggregates recovered from all three methods were different from the original materials. No consistent biases were evident to warrant making adjustments to the tested results.
• L.A. abrasion values for aggregates recovered from the centrifuge extraction were closest to the original values.

Additional tests on the extracted and recovered asphalt binder from the RAP may be required for mix designs that will contain more than 25% RAP. Current best practices for determining RAP binder properties are described in Chapter 3 of NCHRP Report 452 (McDaniel & Anderson, 2001).
Welcome to the LTAP Lending Library where publications, videos, DVD’s, and software may be borrowed for a two-week period. We have a limit of three videotapes or DVD’s for a rent-free two-week period. Some publications are free or for a nominal charge upon request.

For information or checkout procedures, please call Genevieve Albert or Michele Beck, LTAP, 1-800-541-6671. If you have computer access, please e-mail us: mltap(at)montana.edu.

We have new lists for the library publications, software, DVD’s, and videos at our web site, just click on Resources: http://ou.montana.edu/ltap/index.html (Note: Many of our publications are electronically available.) At this web site, you can also keep track of upcoming workshops, past and present newsletters, and workshop announcements.

Our 2015-2016 Needs Assessment Survey is available at this web site. Thank you in advance for taking time to complete it.

### Publications

**p-398 Best Practices for RAP and RAS Management (NAPA January 2016)** This document covers the current best practices for management of reclaimed asphalt pavement (RAP) and reclaimed asphalt shingles (RAS) as of 2015. The goal of this guide is to facilitate the most effective utilization of RAP as a component in asphalt paving mixtures. This document provides guidance for management of RAP from the time of collection through processing, sampling and testing of RAP for mix design, and quality control practices during production of asphalt mixtures containing RAP. A brief section also presents best practices for management of RAS for use in asphalt paving mixtures. Good RAP and RAS management practices are important to ensure the greatest economic benefit of these materials and the highest quality asphalt. **On-line ONLY:** https://www.asphaltpavement.org/PDFs/EngineeringPubs/QIP129_RAP_-RAS_Best_Practices_Jr.pdf

**p-438.100 Long-Term Pavement Performance Automated Faulting Measurement (FHWA February 2015)**

This report documents the development of the Long-Term Pavement Performance (LTPP) automated faulting measurement (AFM) algorithm to identify transverse joint locations on jointed plain concrete pavements and compute faulting at these locations using the profile data collected by LTPP high-speed inertial profilers. (36 Pages) https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/14092/14092.pdf

**p-919 Training and Certification of Highway Maintenance Workers (NCHRP Synthesis 483) 2015**

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. **Online ONLY:** http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_483.pdf

**p-1000.100 Safety Evaluation of Wet Reflective Pavement Markers (FHWA October 2015)** FHWA organized a pooled fund study of 38 States to evaluate low-cost safety strategies as part of its strategic highway safety effort. The wet-reflective pavement markings evaluated in this study are intended to reduce the frequency of crashes by improving the level of retroreflectivity during wet-road conditions. (49 Pages) https://www.fhwa.dot.gov/publications/research/safety/15065/15065.pdf

---

**“Don’t let yesterday take up too much of today.”**

*Will Rogers*
I was working with two new Commissioners who wanted to help but we all were going in three different directions. At one of our road meetings I pointed out we need to work as a team to get through this or we are going to have a bigger mess than a few washed out roads. It also helped that I had experienced four other flood events prior to this one. Working together definitely was a key to getting the job finished.

Being part of MACRS (Montana Association of County Road Supervisors) was a real bonus in several ways. Not only did I gain and build friendships in my district, but now I have friends all over Montana. Having this network to tap into when various issues came up gave me another tool in being an effective road supervisor.

My sincere wish to all Montana County Road Supervisors, County employees, their families, and friends with much success in the coming years. I am sincerely thankful to have had this opportunity to work with you all.

My future endeavors include working on our little farm along with some traveling with my wife, Deb, and spending time with family and six grandchildren.

Sincerely, Jerry Otto
Hill County Road and Bridge Supervisor